Branch of Forest Insect and Disease Prevention and Control
Division of Timber Management
Region 4 Forest Service
U.S. Department of Agriculture
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1972

BIOLOGICAL EVALUATION
Douglas-fir Beetle Infestation
Targhee National Forest

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INTRODUCTION

The following is a biological evaluation of the Douglas-fir beetle infestation on the Targhee National Forest. This report was compiled from aerial survey records, on-the-ground evaluation surveys, and previous reports. The aerial detection survey was flown in mid-July, and on-the-ground evaluations were conducted during early July and early August.

The current Douglas-fir beetle outbreak on the Targhee National Forest was triggered by extensive wind and snow breakage during the winter of 1968-69 (Figure 1). To reduce the potential insect hazard, salvage sales were initiated to utilize the downed material. Unfortunately, because of the extensive nature of the damage, salvage was impractical or uneconomical over a large portion of the area. Beetles emerged from the remaining material and, for lack of additional damaged material, standing trees were attacked. In addition, logging slash in some of the large clearcuts on Big Bend Ridge and Bishop Mountain may have contributed to the overall buildup. In most cases, the heaviest concentrations of attacks have occurred in leave strips and along the edges of clearcut areas (Figures 2 and 3).

TECHNICAL INFORMATION

INSECT: Douglas-fir beetle, Dendroctonus pseudotsugae Hopkins.

HOST: Douglas-fir, Pseudotsuga menziesii (Mirb).

TYPE OF DAMAGE: Killing of Douglas-fir. Mortality commonly occurs in groups of 10-30 trees.

EXTENT OF OUTBREAK: Tree killing is occurring over most of the Douglas-fir type on the northern portion of the Forest. Heaviest losses are occurring on Big Bend Ridge, Bishop Mountain, and along the south side of the Continental Divide (see Figure 7).

LOCATION: The Dubois, Island Park, and Ashton Ranger Districts, Targhee National Forest, Idaho.

BIOLOGICAL INFORMATION

Three areas having heavy concentrations of Douglas-fir beetle activity were surveyed using the strip plot method. Douglas-fir mortality was recorded by year and diameter class on one-half chain by 10-chain plots. A resumé of these data follow:

Area	Trees Per Acre 1/			
	1972 Attacks	1971 Attacks	1970 & Before	Total Mortality
Thurburn Ridge	16.0	9.7	6.0	31.7
Taylor Creek	2.6	1.0	1.2	4.8
Twin Creek	8.8	1.8	2.2	12.8

1/ These data are summarized by diameter class in Tables 1, 2 and 3.

Average mortality for these areas was 16.4 trees per acre. Since these areas were selected in stands with the heaviest infestations, these figures probably represent the upper extreme of tree killing. Forest-wide losses will average much less.

The Thurburn Ridge cruise area (Figure 3) was located near several large clearcut blocks where salvage logging had removed some of the heaviest concentrations of blowdown. Taylor Creek and Twin Creek (Figure 4) are along the south side of the Continental Divide where storm damage was not as great. Recent blowdown was noticeably absent from all areas examined. These include the following:

Big Bend Ridge
Bishop Mountain
Green Canyon
Thurburn Ridge
West Dry Creek
Howard Creek
Taylor Creek
Snyder Creek
Blind Canyon
Ice House Creek
Dry Canyon
White Elephant Canyon
Twin Creek
Jessie Creek

The unweighted tree tallies recorded for the three cruise areas were 105 new attacks and 43 old attacks. This represents an attack ratio of 2.4:1.

General observations on brood density and condition are summarized below:

Area	Brood Stage	Brood Density	Egg Gallery Length (inches)
Thurburn Ridge	Small & Medium Larvae	Heavy	8-10
Taylor Creek	Eggs & Small Larvae	Heavy	6-8
Twin Creek	Eggs 1/	Heavy 2/	1-3

1/ See Figure 5.
2/ See Figure 6.

DISCUSSION

From the outset of this infestation, tree killing has increased each year. The aerial detection survey revealed an increase in extent and intensity during 1970 and 1971. On-the-ground surveys recorded a 2.4:1 buildup during 1972. Even though salvage logging removed much of the damaged material, beetle populations increased to epidemic proportions. Logging, in fact, may have contributed to the problem, since heaviest losses have occurred near clearcut blocks.

The outlook for 1973 is not good. Several elements of the infestation favor continued tree killing during 1973. The most important of these include the following:

1. The infestation is young.

2. There are sufficient host trees available.

3. The broods are well established.

4. Brood density is heavy.

5. The current trend is increasing.

Unless unforeseen brood mortality occurs prior to the spring flight, tree killing will increase during 1973. Since the Douglas-fir beetle can sustain itself in green trees for only 3-4 years, the infestation should subside in 2 or 3 years.

The vast expanse and increasing trend of the infestation preclude any effective control measure. Through logging, some of the threatened timber can be utilized, but this will in no way alter the eventual

course of the infestation. The only effective and long-term solution to recurring bark beetle outbreaks is to convert the highly susceptible mature and overmature stands to a more vigorous condition. However, the immediate objective should be to salvage infested timber prior to emergence.

RECOMMENDATIONS

The Douglas-fir stands on the Targhee National Forest are highly susceptible to bark beetle attack and subsequent losses. To reduce the susceptibility of these stands, the Forest must implement a stand conversion plan based on sound entomological data. Until these stands are managed with due regard for recurring insect problems, sizeable losses can be expected to continue.

Realizing stand conversion will require many years, the following recommendations are made as short-term alternatives:

1. Although there are no large concentrations of storm-damaged material at this time, if practical and economically feasible, any downed material should be removed before the insect broods emerge.

2. Modify the present logging schedule in order to concentrate logging in areas of greatest hazard; i.e., areas having the highest concentrations of mature and overmature Douglas-fir.

3. Log infested stands to remove infested timber. First priority should be in and near ongoing sales and in other accessible areas such as those between and along the edges of the clearcuts.

4. Do not use direct control methods (chemical treatments, fall and burn, etc.).

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APPENDIX

Figure 1. Winter storm damage of 1968-69 in Twin Creek, Targhee National Forest.

Figure 2. Douglas-fir beetle infested leave strip on Big Bend Ridge, Targhee National Forest. Note mortality along upper edge of clearcut.

Figure 3. Aerial photograph of survey area and Thurburn Ridge, Targhee National Forest. Mortality in upper right corner of photograph is lodgepole pine.

Figure 4. Aerial photograph of survey area in Twin Creek, Targhee National Forest.

Figure 5. Douglas-fir beetle egg gallery showing eggs and parent adult.

Figure 6. Douglas-fir bark sample showing Douglas-fir beetle attack density.

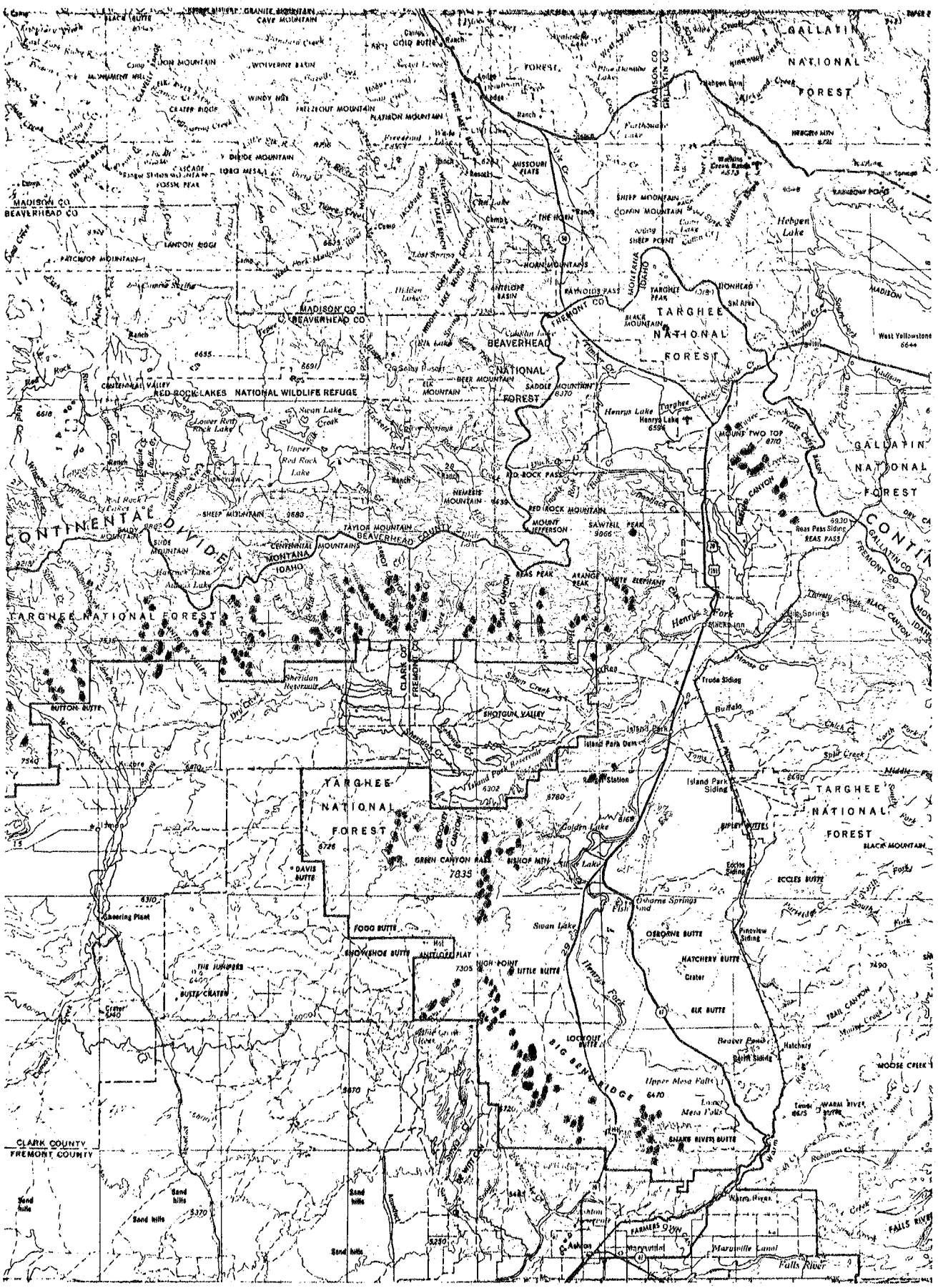

Figure 7. Areas of Douglas-fir beetle infestation recorded during the aerial detection survey July, 1972.

USFS INSECT SURVEY

POPULATION STAND TABLE — LOCATION THURBURN RIDGE

HOST SPECIES IS DOUGLAS-FIR — THE INSECT NAME IS DOUGLAS-FIR BEETLE

THE METHOD OF SAMPLING WAS STRIP — STRIPS WERE 0.50 CHAINS WIDE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 6 PLOTS

THIS TABLE ONLY INCLUDES HOST TREES

NUMBER OF TREES PER ACRE

DBH	1972 ATTACKS	1971 ATTACKS	1970 & BEFORE	TOTAL DEAD
9.0-10.9	0.33	-	-	0.33
11.0-12.9	1.33	0.66	-	2.00
13.0-14.9	1.00	0.33	1.33	2.66
15.0-16.9	4.33	0.33	1.33	6.00
17.0-18.9	2.33	0.66	1.33	4.33
19.0-20.9	4.00	2.33	0.66	7.00
21.0-22.9	1.66	2.00	1.00	4.66
23.0-24.9	0.33	0.66	-	1.00
25.0-26.9	-	0.66	-	0.66
27.0-28.9	0.66	1.00	-	1.66
29.0-30.9	-	0.33	-	0.33
31.0-32.9	-	0.33	-	0.33
39.0-40.9	-	0.33	0.33	0.66
Total	16.00	9.67	6.00	31.67

Table 1. Douglas-fir mortality by year and diameter class on Thurburn Ridge, Targhee National Forest.

USFS INSECT SURVEY

POPULATION STAND TABLE — LOCATION TAYLOR CREEK

HOST SPECIES IS DOUGLAS-FIR — THE INSECT NAME IS DOUGLAS-FIR BEETLE

THE METHOD OF SAMPLING WAS STRIP — STRIPS WERE 0.50 CHAINS WIDE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 10 PLOTS

THIS TABLE ONLY INCLUDES HOST TREES

NUMBER OF TREES PER ACRE

DBH	1972 ATTACKS	1971 ATTACKS	1970 & BEFORE	TOTAL DEAD
15.0-16.9	0.20	-	0.20	0.40
17.0-18.9	0.60	-	-	0.60
19.0-20.9	0.20	0.40	-	0.60
21.0-22.9	0.60	-	-	0.60
23.0-24.9	-	-	0.20	0.20
25.0-26.9	-	0.20	-	0.20
27.0-28.9	0.40	0.20	-	0.60
31.0-32.9	0.20	-	0.40	0.60
33.0-34.9	0.40	0.20	-	0.60
39.0-40.9	-	-	0.20	0.20
59.0-60.9	-	-	0.20	0.20
Total	2.60	1.00	1.20	4.80

Table 2. Douglas-fir mortality by year and diameter class in Taylor Creek, Targhee National Forest.

USFS INSECT SURVEY

POPULATION STAND TABLE — LOCATION TWIN CREEK

HOST SPECIES IS DOUGLAS-FIR — THE INSECT NAME IS DOUGLAS-FIR BEETLE

THE METHOD OF SAMPLING WAS STRIP — STRIPS WERE 0.50 CHAINS WIDE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 10 PLOTS

THIS TABLE ONLY INCLUDES HOST TREES

NUMBER OF TREES PER ACRE

DBH	1972 ATTACKS	1971 ATTACKS	1970 & BEFORE	TOTAL DEAD
7.0- 8.9	0.40	-	-	0.40
9.0-10.9	0.80	0.20	-	1.00
11.0-12.9	2.40	-	0.20	2.60
13.0-14.9	1.80	-	0.20	2.00
15.0-16.9	1.40	-	0.20	1.60
17.0-18.9	0.80	0.40	0.20	1.40
19.0-20.9	0.20	-	0.20	0.40
21.0-22.9	0.80	0.80	0.20	1.80
23.0-24.9	0.20	-	0.40	0.60
25.0-26.9	-	0.40	0.20	0.60
27.0-28.9	-	-	0.20	0.20
29.0-30.9	-	-	0.20	0.20
Total	8.80	1.80	2.20	12.80

Table 3. Douglas-fir mortality by year and diameter class in Twin Creek, Targhee National Forest.